

# Chapter 6 Life Processes

## Very Short Answer Type Question [1 Mark]

**Q. Mention the raw materials required for photosynthesis.**

**Answer.** The following raw materials are required for photosynthesis:

- (i) Carbon Dioxide: Plants get  $\text{CO}_2$  from atmosphere through stomata.
- (ii) Water: Plants absorb water from soil through roots and transport to leaves.
- (iii) Sunlight: Sunlight, which is absorbed by the chlorophyll and other green parts of the plant.

**Q. What would be the consequences of deficiency of hemoglobin in your body?**

**Answer.** The deficiency of hemoglobin in our body is called anemia. In anemia, the blood is unable to carry the sufficient amount of oxygen required by the body. So, respiration would be less and less energy will be available to the body. The hemoglobin deficient person will feel weak, pale, lethargic and will be unable to perform heavy physical work.

**Q. Name the green dot like structures in some cells observed by a student when a leaf peel was viewed under a microscope. What is this green colour due to?**

**Answer.** The green dot-like structures in some cells observed by a student when a leaf peel is viewed under a microscope are chloroplasts. The green colour is due to the presence of green pigment, chlorophyll.

**Q. State any one difference between autotrophic and heterotrophic modes of nutrition.**

**Answer.** In autotrophic nutrition, organisms obtain their food from inorganic substances. In heterotrophic nutrition, organisms derive their food from organic substances.

**Q. Give one reason why multicellular organisms require special organs for exchange of gases between their body and their environment. :**

**Answer.** In unicellular organisms the entire body of the organism is in contact with the environment hence exchange of materials can take place but, in multicellular organisms the entire body of the organism is not in contact with the environment and hence simple diffusion is not helpful.

**Q. Name the process in plants where water is lost as water vapour. :**

**Answer.** Transpiration is the process when plants lose water as vapour.

**Q. What is 'translocation' in plants?**

**Answer.** Translocation is the movement of soluble materials, products of photosynthesis from leaves to other tissues throughout the plant.

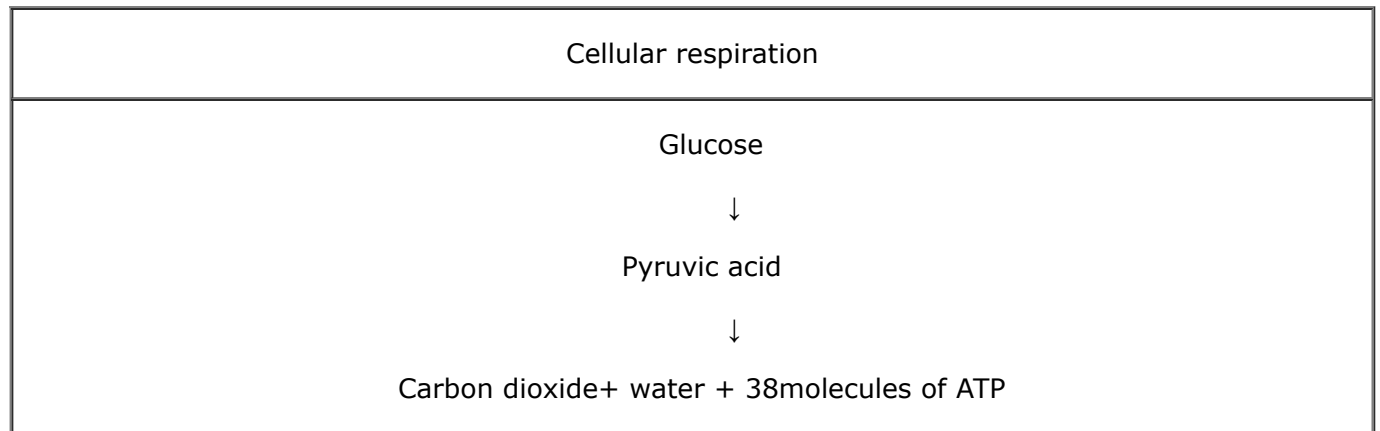
**Q. State the basic difference between the process of respiration and photosynthesis.**

**Answer.**

Respiration	Photosynthesis
(i) It takes place in all living cells.	(i) Takes place only in green plant cells.
(ii) Respiration uses $\text{O}_2$ and releases $\text{CO}_2$ .	(ii) In photosynthesis, $\text{CO}_2$ is used and $\text{O}_2$ is released.

**Q. Name the intermediate and the end products of glucose breakdown in aerobic respiration.**

**Answer.**



**Q. In the experiment “Light is essential for photosynthesis”, why does the uncovered part of the leaf turn blue-black after putting iodine solution?**

**Answer.** Starch is produced in the uncovered part of the leaf because it is exposed to sunlight allowing it to photosynthesize, which turns blue-black in presence of iodine solution.

**Q. Name the component of blood that helps in the formation of blood clot in the event of a cut.**

**Answer.** Platelets help in clotting of blood in the event of a cut.

**Q. Mention how organisms like bread moulds and mushrooms obtain their food.**

**Answer.** Organisms like bread moulds and mushrooms breakdown the food materials outside the body and then absorb the nutrients of the bread.

**Q. What will happen to a plant if its xylem is removed?**

**Answer.** Xylem in plant transports water and dissolved mineral nutrients from the roots to all parts of the vascular plant. So, if xylem is removed from the plant, the water and mineral supply to the plant will stop and therefore, the plant will die.

**Q. Where does digestion of fat take place in our body?**

**Answer.** Digestion of fat takes place in the small intestine of our body.

**Q. What is the mode of nutrition in human beings?**

**Answer.** Holozoic nutrition.

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### Short Answer Type Questions [2 Marks]

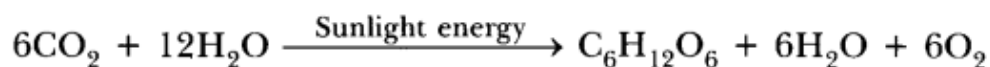
**Q. What are enzymes? Name any one enzyme of our digestive system and write its function.**

**Answer.** Enzymes are biological catalysts. Catalysts are proteins that increase the rate of chemical reactions without being used up. For example: Amylase catalyses the breakdown of starch into sugars in the mouth and small intestine

**Q. (i) Write the balanced chemical equation for the process of photosynthesis,  
(ii) When do the desert plants take up carbon dioxide and perform photosynthesis ?**

**Answer.**

(i) Photosynthesis can be represented using a chemical equation. The overall balanced equation is



(ii) Desert plants open up their stomata during night and take in  $\text{CO}_2$ . Stomata remains close during the day time to prevent the loss of water by i transpiration. They store the  $\text{CO}_2$  in their cells until the sun comes out and they can carry on with photosynthesis during the day time.

**Q. Why do herbivores have longer, small intestine than carnivores ?**

**Answer.** Digestion of cellulose takes a longer time. Hence, herbivores eating grass need a longer small intestine to allow complete digestion of cellulose. Carnivorous animals cannot digest cellulose due to the absence of enzyme CELLULASE, hence they have a shorter intestine.

**Q. Write correct sequence of four steps of method for the preparation of temporary mount of a stained leaf peel.**

**Answer.**

1. Take a healthy leaf from the potted plant.
2. Remove a part of the peel from the lower surface of the leaf. You can do this by folding the leaf over and gently pulling the peel apart using forceps. Keeps the peel in a watch glass containing water.
3. Put a few drops of safranin stain in a watch glass.
4. After 2-3 minutes take out the peel and place it on a clean glass slide.
5. Put a drop of glycerin over the peel and place a clean covers lip gently over it with the help of a needle.
6. Remove the excess stain and glycerin with the help of blotting paper.
7. Observe the slide under magnifications of the compound microscope.

**Q. Why do the walls of the trachea not collapse'when there is less air in it?**

**Answer.** Rings of cartilages are present in trachea. These rings support the trachea and do not allow the trachea to collapse when there is less air in it.

**Q. What are the final products after digestion of carbohydrates and proteins?**

**Answer.** The final product produced after digestion of carbohydrates is glucose and of proteins is amino acids.

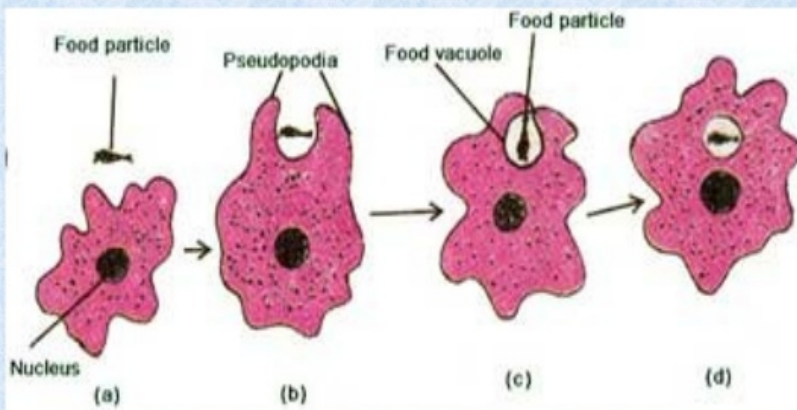
**Q. What is saliva? State its role in the digestion of food.**

**Answer.** Saliva is a watery fluid secreted by the salivary glands in the mouth. The digestive functions of saliva include moistening food, and helping to create a food bolus, so it can be swallowed easily. Saliva contains the enzyme amylase that breaks some starches down into maltose and dextrin.

**Q. Explain the process of nutrition in Amoeba.**

**Answer.** Amoeba is an important protozoa found in fresh water. It feeds on microscopic plants and animals present in water. The mode of nutrition in amoeba is Holozoic. And the process of obtaining food by amoeba is called phagocytosis. The different processes involved in the nutrition of amoeba are:

## **NUTRITION IN AMOEBA**



1. **Ingestion:** Ingestion is the process of taking food in the body. Amoeba is a unicellular animal, so it doesn't have a mouth for ingestion of food. Amoeba ingests the food by encircling it by forming pseudopodia. When the food is completely encircled, the food is engulfed in the form of a bag called food vacuole.
2. **Digestion:** Digestion is the process of breaking the large and insoluble molecules in small and water soluble molecules. In amoeba, several digestive enzymes react on the food present in the food vacuoles and break it down into simple and soluble molecules.
3. **Absorption:** The food digested by digestive enzymes is then absorbed in the cytoplasm by the process of diffusion. While the undigested food remains in the food vacuole. If a large amount of food is absorbed by amoeba, the excess food is stored in the cytoplasm in the form of glycogen and lipids.
4. **Assimilation:** During this step the food absorbed by the cytoplasm is used to obtain energy, growth and repair. This process of utilizing absorbed food for obtaining energy, repair and growth is called assimilation.
5. **Egestion:** When a sufficient amount of undigested food gets collected in the food vacuole, it is thrown out of the body by rupturing cell membrane. The process of removal of undigested food from the body is called egestion.

### **Q. State two differences between arteries and veins.**

**Answer.** Arteries

1. Arteries carry oxygenated blood, away from the heart except pulmonary artery.
2. These are thick-walled, highly muscular except arteries of cranium and vertebral column.
3. Valves are absent.

Blood in arteries moves with pressure. Veins

1. Veins carry deoxygenated blood, towards the heart except pulmonary veins.
2. These are thin-walled.
3. Valves are present which provide unidirectional flow of blood.
4. Blood in veins moves under very low pressure.

### **Q. How are the alveoli designed to maximise the exchange of gases?**

**Answer.** Alveoli are small pouches or sacs like structure. They are surrounded by blood capillaries. Thus a large amount of air is brought in contact with the air in the lungs. More than millions of alveoli are present in the lungs. The presence of millions of alveoli in the lungs provides a very large surface area for the exchange of gases. The availability of large surface area maximises the exchange of gases.

### **Q. Name two excretory products other than O<sub>2</sub> and CO<sub>2</sub> in plants.**

**Answer.** The two excretory products other than  $O_2$  and  $CO_2$  in plants are resins and gums.

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### Short Answer Type Questions [3 Marks]

**Q. In single celled organisms diffusion is sufficient to meet all their requirements of food, exchange of gases or removal of wastes but it is not in case of multicellular organisms. Explain the reason for this difference.**

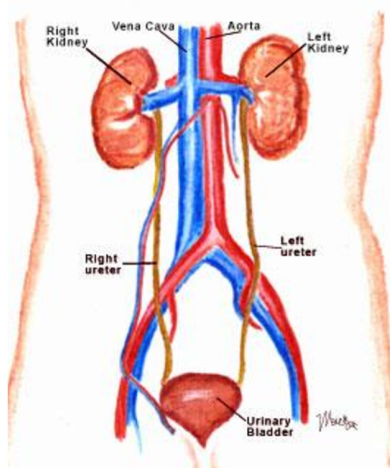
**Answer.** Unicellular organisms can absorb sufficient oxygen because of its complete contact with the atmosphere, but in multicellular organisms the rate of absorption and diffusion becomes very less because all cells are not in direct contact with the atmosphere. Multicellular organisms require greater amount of oxygen to sustain life processes which cannot be fulfilled by the process of diffusion.

**Q. Draw a diagram of human excretory system and label kidneys, ureters on it.**

**Answer.**

### Excretory System

- Removal of waste from the body



**Q. Name the acid presents in the following:**

**(i) Tomato (ii) Vinegar (iii) Tamarind**

**Answer.**

(i) Oxalic acid (ii) citric acid (iii) Tartaric acid.

**Q. State the role of the following in human digestive system :**

**(i) Digestive enzymes (ii) Hydrochloric acid (iii) Villi**

**Answer.**

(i) Digestive enzymes – Foods need to be broken into their small or simpler molecules so that they can be absorbed into the bloodstream. However, the physical breakdown of food is not enough. Enzymes are hence needed for the chemical breakdown of food and speeding up the digestive process. The products of digestion can hence be small enough to be absorbed.

(ii) Hydrochloric acid – Hydro chloric acid helps to kill the germs which might have entered in to the system through food. It creates acidic medium for the pepsin to act on food to breakdown proteins.

(iii) Villi – Villi are finger like projections in the small intestine. They help to increase the surface area for absorption of the digested food. Villi are richly supplied with blood vessel which help to absorb digested food in to the blood stream.

**Q. In mammals and birds why is it necessary to separate oxygenated and de-oxygenated blood ?**

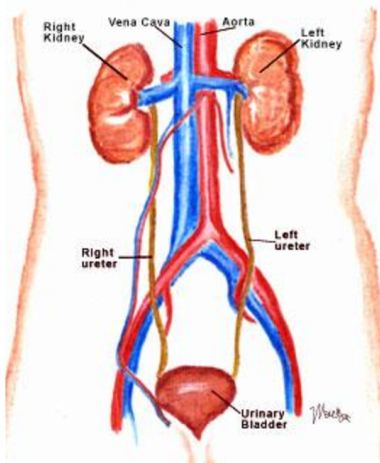
**Answer.** Mammals and birds are warm blooded animals. This means they can control their body temperature and do not have to depend on environment for their body temperature regulation. Because of this birds and mammals require optimum oxidization of glucose which would be possible with good supply of oxygen. So it is required to have separate oxygenated and de-oxygenated blood to supply the required amount of oxygen.

**Q. Draw a neat diagram of excretory system of human beings and label on it:**  
**(i) Left kidney (ii) Urinary bladder**

**Answer.**

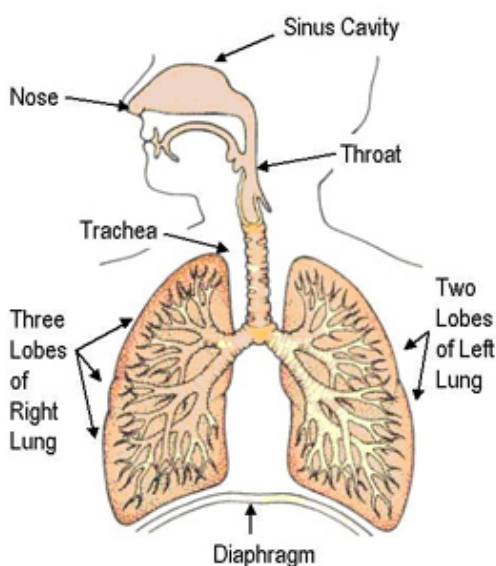
## Excretory System

- Removal of waste from the body



**Q. Draw a diagram of human respiratory system and label on it :**  
**(i) Diaphragm (ii) Larynx**

**Answer.**



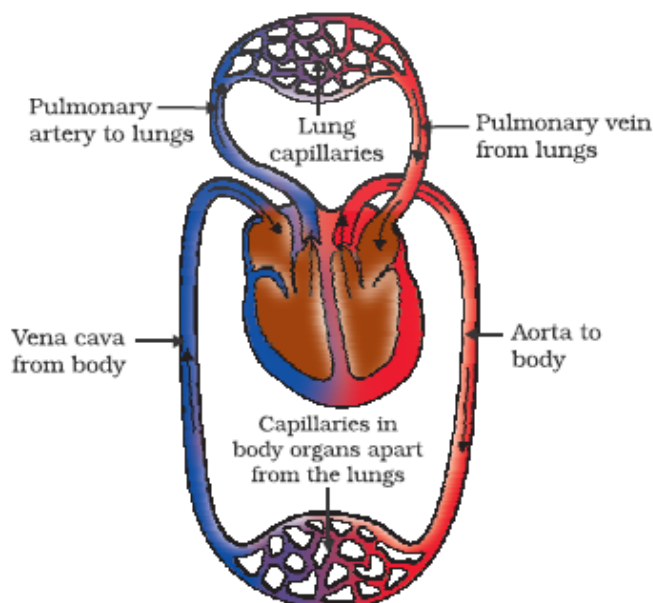
**Q. (a) Name the site of exchange of material between the blood and surrounding cells. (b) Draw a schematic representation of transport and exchange of oxygen and carbon dioxide in human body.**

**Answer.**

(a) Capillaries



(b)



**Q. List three characteristics of lungs which make it an efficient respiratory surface.**

**Answer.** These features which particularly make our lungs efficient for gas exchange.

**1.Thin:** the air sac walls are very thin so that gases can quickly diffuse through them. Oxygen is absorbed in to the blood and carbon dioxide is given out in to the lungs to be exhaled out.

**2.Moist:** the air sacs are moist with mucus so that gases can dissolve before diffusing.

**3.Large surface area:** the surface area for gases to diffuse through in human lungs is roughly the same as a tennis court. The alveoli help to increase the surface area for absorption of oxygen.

**4.Good blood supply:** the air sacs or the alveoli have a large capillary network so that large volumes of gases can be exchanged. More the flow of blood more exchange.

**Q. (a) What is the role of HCl in our stomach ?**

**(b) What is emulsification of fats ?**

**(c) Which protein digesting enzyme is present in pancreatic juice ?**

**Answer.**

(a)(i) It sterilises food by killing pathogens and other microbes.

(ii) It has a pH of 2, which is perfect for enzymes such as pepsin to break down proteins as effectively as possible.

(iii) Helps emulsify food (digestion of protein and stimulates the pancreas to produce digestive enzymes and bile) and protects against harmful bacteria

(b) Breakdown of large globule fats into smaller fats droplets is known as emulsification.

(c) Trypsin is the enzyme secreted by the pancreas which aids in digestion of proteins.

**Q. List in tabular form three differences between arteries and veins.**

**Answer.**

Arteries	Veins
(i) Arteries carry oxygenated blood, away from the heart except pulmonary artery.	(i) Veins carry deoxygenated blood, towards the heart except pulmonary veins.
(ii) These are mostly deeply situated in the body.	(ii) These are superficial and deep in location.
(iii) These are thick-walled, highly muscular except arteries of cranium and vertebral column.	(iii) These are thin-walled.

**Q. In human alimentary canal, name the site of complete digestion of various components of food. Explain the process of digestion.**

**Answer.** In small intestine, complete digestion of various components of food take place. The process of digestion of food in mouth, stomach and small intestine in human body are as follows:

**Mouth:** Digestion of food begins in the mouth. Saliva present in mouth contains a digestive enzyme, called salivary amylase, maltose and dextrins, which breaks down starch into sugar.

**Stomach:** Stomach stores and mixes the food received from the oesophagus with gastric juices. The main components of gastric juice are hydrochloric acid, mucus and pepsinogen. Hydrochloric acid dissolves bits of food and creates an acidic medium. In this medium, pepsinogen is converted to pepsin which is a protein-digesting enzyme. Mucus protects the inner lining of the stomach from the action of HCl.

**Small Intestine:** Small intestine is the site of complete digestion of carbohydrates, proteins and fats. Small intestine produces intestinal juice from the glands present in its wall. The intestinal juice helps in further digestion of food. Small intestine also obtains digestive juices from liver and pancreas. The liver produces bile juice that causes emulsification of fats and the pancreas produces pancreatic juice for digesting proteins and emulsified fats. This digested food is finally absorbed through the intestinal walls.

**Q. List the three kinds of blood vessels of human circulatory system and write | their functions in tabular form.**

**Answer.** Three types of blood vessels in human circulatory system are: Arteries, Veins and Capillaries.

Their functions are tabulated below:

Arteries	Veins	Capillaries
Arteries carry oxygenated blood from heart to various organs of the body.	Veins carry deoxygenated blood from various organs to heart.	Exchanges of materials between blood and surrounding cells take place in the capillaries.

**Q. (a) "The breathing cycle is rhythmic whereas exchange of gases is a continuous process". Justify this statement.**

**(b) What happens if conducting tubes of circulatory system develops a leak? State in brief, how could this be avoided?**

**(c) How opening and closing of stomata takes place?**

**Answer.** (a) The breathing cycle involves inhalation and exhalation of air due to alternate expansion and contraction of thoracic cavity. Thus it is a rhythmic process. But exchange of gases is a continuous process as it takes place between the blood and each and every cell, by diffusion.

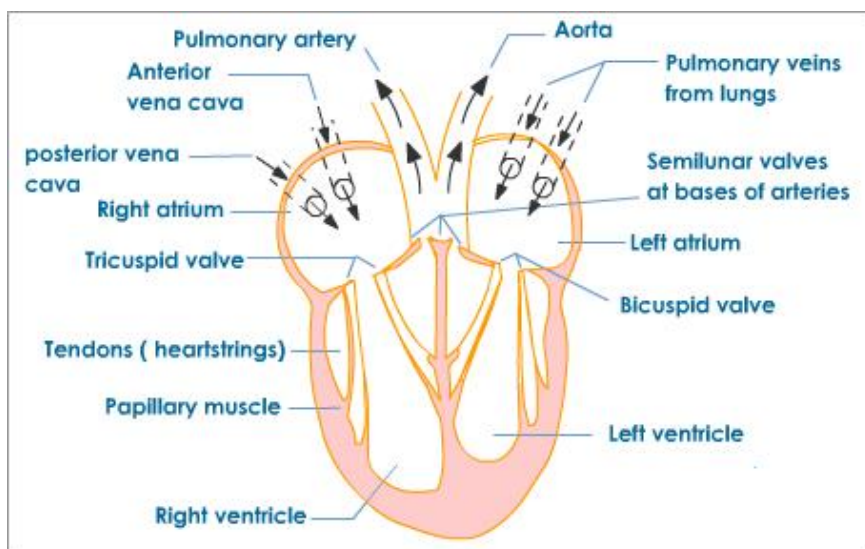
(b) The circulatory system will become inefficient if it develops a leak. This could be avoided by maintaining a normal blood pressure.

(c) When water flows into the guard cells, the guard cells swell and the stomatal pore opens up. When water moves out the guard cells shrink and the stomatal pore closes.

**Q. Draw a diagram of the front view of human heart and label any six parts including at least two, that are concerned with arterial blood supply to the heart muscles.**

**Answer.**





**Q. Describe in brief the function of kidneys, ureters, urinary bladder and urethra.**

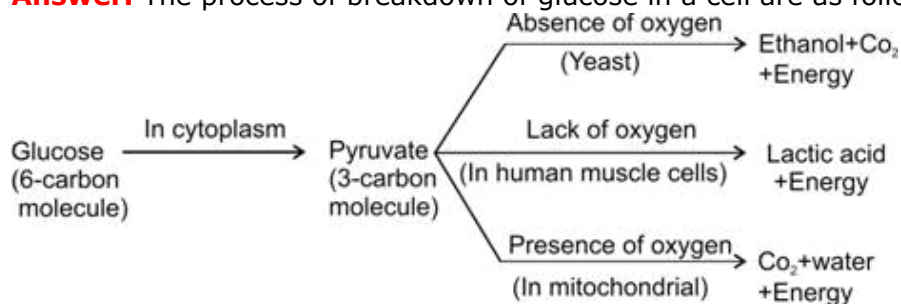
**Answer.** The Kidneys filter the blood and concentrate the filtrate to make urine. They also help regulate blood pressure.

Ureters transport the urine to the urinary bladder.

Urinary bladder is like a holding tank for the urine until it's ready to be excreted. Urethra is the tube that connects the urinary bladder to the outside of the body for excretion.

**Q. Explain the process of breakdown of glucose in a cell (ii) in the absence of oxygen.**

**Answer.** The process of breakdown of glucose in a cell are as follows:



#### (Break down of glucose by various pathways)

The first step in the breakdown of glucose both in presence of  $O_2$  and in absence of  $O_2$  is same. In this step, glucose is broken down into pyruvate.

Second step which involves further breakdown of private into simple compounds can take place in two different ways:

(i) In presence of  $O_2$ : In the presence of  $O_2$ , private is converted into  $CO_2$  and water. Energy released during aerobic respiration is much greater than that released during an anaerobic respiration.

(ii) In absence of  $O_2$ : In the absence of  $O_2$  in yeast, pyruvate is converted into ethanol and  $CO_2$  and the process is called fermentation. In absence of  $O_2$ , in our muscle cells, pyruvate is converted into lactic acid. The build up of lactic acid in muscle cells causes cramps.

### Long Answer Type Question [5 Marks]

**Q. (a) Explain how does the exchange of gases occur in plants across the surface of stems, roots and leaves.**

**(b) How are water and minerals transported in plants ?**

**Answer.**

(a) In plants there are tiny pores called stomata on leaves and lenticels in stem which facilitate the exchange of gases. Carbon dioxide is taken in and oxygen given out {during photosynthesis} and vice versa during respiration.

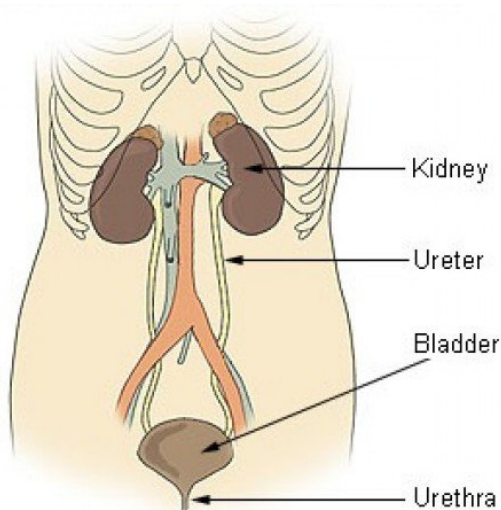
(b) Water and minerals are transported within the plant by the Xylem vessels (mainly in an upward direction); these are part of the vascular system which also includes Phloem vessels.

Phloem transports the products of photosynthesis within the plant, to all parts like the stem, roots, fruits etc. in all directions.

**Q. Draw a diagram of human excretory system and label renal artery and urethra. State in brief the function of :**

1. renal artery
2. kidney
3. ureter
4. urinary bladder

**Answer.**

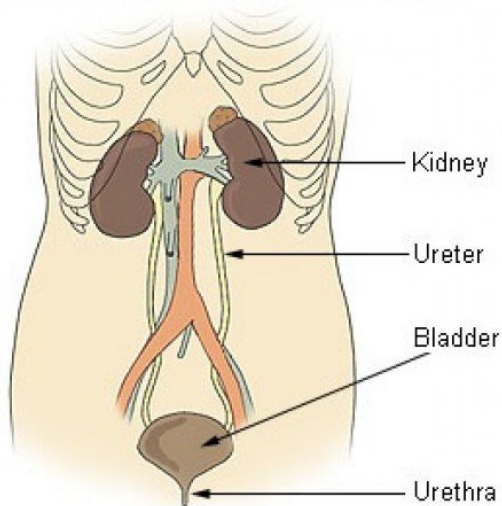


1. **Renal artery:** The renal artery carries blood to the kidneys from the abdominal aorta. This blood comes directly from the heart and is sent to the kidneys to be filtered before it passes through the rest of the body. Up to one-third of the total cardiac output per heartbeat is sent to the renal arteries to be filtered by the kidneys. Each kidney has one renal artery that supplies it with blood. The filtered blood then can exit the renal vein.
2. **Kidney:** The kidneys perform the essential function of removing waste products from the blood and regulating the water fluid levels. The kidneys regulate the body's fluid volume, mineral composition and acidity by excreting and reabsorbing water and inorganic electrolytes.
3. **Ureter:** The ureter is a tube that carries urine from the kidney to the urinary bladder. There are two ureters, one attached to each kidney.
4. **Urinary bladder:** The urinary bladder is an expandable muscular sac that stores urine before it is excreted out of the body through the urethra.

**Q. (a) Draw a diagram of excretory system in human beings and label the following parts. Aorta, kidney, urinary bladder and urethra.**

**(b) How is urine produced and eliminated ?**

**Answer. (a)**



(b) Blood from the heart comes into the kidneys afferent and efferent arteriols from the renal arteries where it enters about 2-3 million nephrons per kidney. Then, it goes through the glomerulus a tuft or bunch of blood capillaries and get rid of some of the unwanted substances like urea, uric acid, creatinine in the blood and then continues through the renal tubules. The loop of Henley, reabsorb certain substances such as water (actually if body is dehydrated, body will send anti-diuretic hormone (ADH) to kidneys to prevent extra water from going into urine and thus saving water for body and get rid of anything else that isn't wanted, then the urine goes through ureters to bladder and then to urethra where it is excreted out of body as urine.

**Q. (a) Draw a diagram to show open stomatal pore and label on it:**

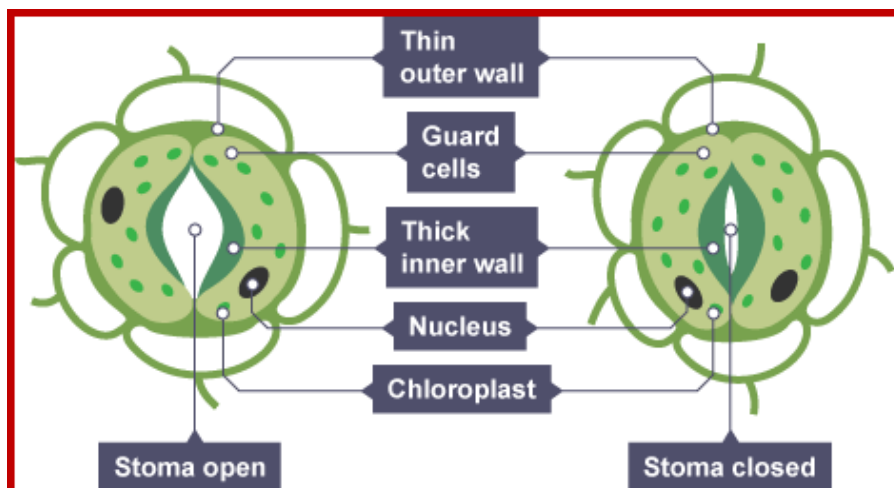
**(i) guard cells**

**(ii) chloroplast**

**(b) State two functions of stomata.**

**(c) How do guard cells regulate the opening and closing of stomatal pore?**

**Answer. (a)**



(b) Two functions of stomata are:

(i) Exchange of gases between the plant and the atmosphere takes place through stomata.

(ii) Transpiration in plants takes place through stomata.

(c) Opening and Closing of Stomatal Pore: The opening and closing of the pore is a function of the guard cells. The guard cells swell when water flows into them causing the stomatal pore to open. Similarly, the pore closes if the guard cells shrink. As large amount of water is lost through these stomata, the plant closes these pores when it does not require carbon dioxide for photosynthesis.

**Q. (a) Draw a diagram of human respiratory system and label the following:**

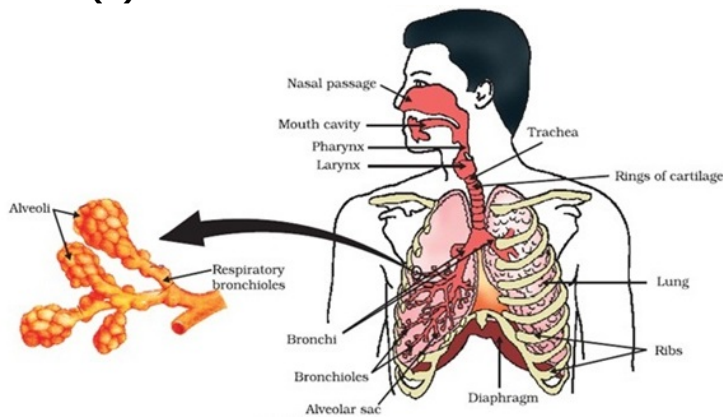
**(i) part where air is filtered by fine hair and mucus**

(ii) part which terminates in balloon – like structures

(iii) balloon – like structures where exchange of gases takes place. (iv) part which separates chest cavity from abdominal cavity.

(b) Why is the rate of breathing in aquatic organisms much faster than in terrestrial organisms?

**Answer. (a)**



(b) Quantity of dissolved oxygen is fairly low in water as compared to the amount of oxygen in air. Aquatic organisms therefore have to breath faster than terrestrial organisms to absorb the required amount of oxygen from the water.

**Q. Draw a neat diagram of excretory system of human beings and label the following:**

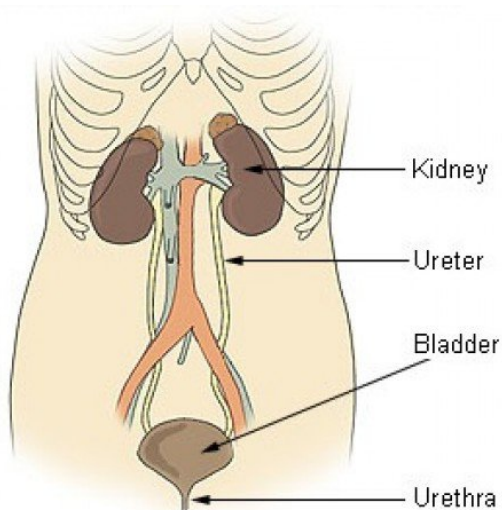
(i) Kidney

(ii) Ureter

(iii) Urinary Bladder

(iv) Urethra

**Answer.**

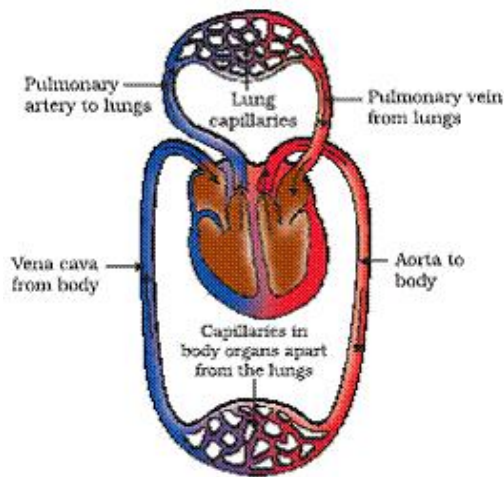


**Q. (a) Draw a schematic representation of transport and exchange of oxygen and carbon dioxide during transportation of blood in human beings and label on it:**

**Lung capillaries, Pulmonary artery to lungs, Aorta to body, Pulmonary veins from lungs.**

**(b) What is the advantage of separate channels in mammals and birds for oxygenated and deoxygenated blood?**

**Answer.(a)** A schematic representation of transportation and exchange of oxygen and carbon dioxide during transportation of blood in human beings



*Schematic representation of transport and exchange of oxygen and carbon dioxide*

(b) It is necessary to separate oxygenated and deoxygenated blood in mammals and birds because they need high energy and large amount of oxygen. The separation of oxygenated and deoxygenated blood provides high oxygen supply to the organs.

**Q. (a) Draw a diagram depicting Human Alimentary Canal and label on it: Gall bladder, Liver and Pancreas.**

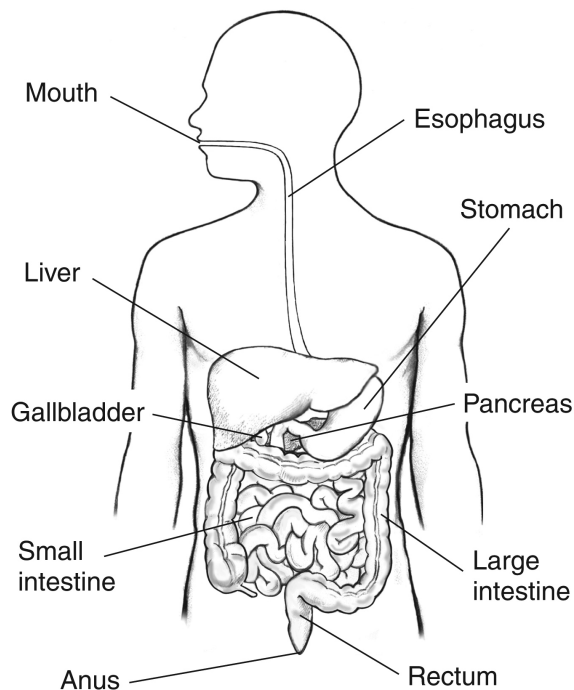
**(b) State the roles of Liver and Pancreas.**

**(c) Name the organ which performs the following functions in humans:**

**(i) Absorption of digested food**

**(ii) Absorption of water.**

**Answer. (a)**



(b) Liver: It synthesizes and stores bile juice secreted by the gall bladder which breaks down fats into fat globules.

(c) The organ which performs the following functions in humans are as follows:

Pancreas: It secretes pancreatic juice which contains protein-digesting and starch-digesting enzymes. \*

(i) Absorption of digested food – Small intestine.

(ii) Absorption of water – Large intestine.

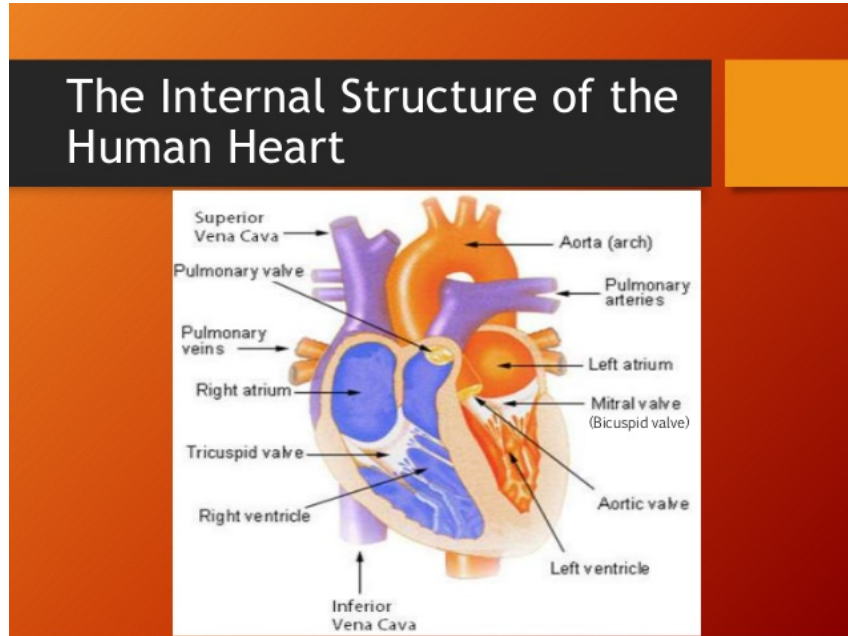


**Q. (a) Draw a sectional view of the human heart and label on it – Aorta, Right ventricle and Pulmonary veins.**

**(b) State the functions of the following components of transport system:**

**(i) Blood (ii) Lymph**

**Answer. (a)**



**(b) The functions of blood and lymph are as follows:**

**(i) Blood**

- Oxygen is transported by the blood to the tissues of the body for the breakdown of digested food.
- Carbon dioxide is transported to the lungs by the blood plasma.
- The digested and absorbed nutrients are transported by blood to the tissues. Nitrogenous wastes are transported to the kidneys.
- It regulates the body temperature and maintains the pH of the body tissues.
- It transports various hormones from one region to another and bring about the coordination.
- It maintains water balance to constant level.
- The lymphocytes produce antibodies against the invading antigens and protect from diseases.
- It helps in rapid healing of wounds by forming a clot at the site of injury.

**(ii) Lymph**

- It cleans the cellular environment.
- It returns proteins and tissue fluids to the blood (drainage)
- It provides a pathway for the absorption of fats and fat-soluble vitamins into the bloodstream.
- It defends the body against disease.

**Q. (a) Draw a labelled diagram of the respiratory system of human beings with diaphragm at the end of expiration.**

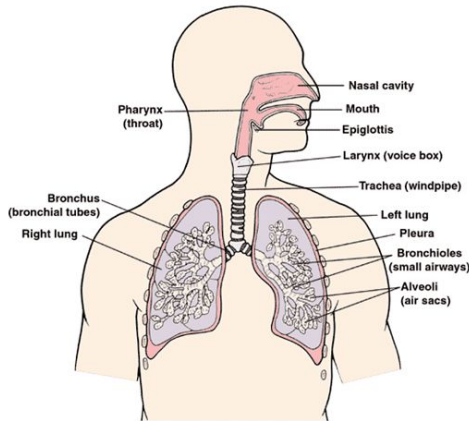
**(b) List four conditions required for efficient gas exchange in an organism.**



**Answer. (a)**

## Human Respiratory System

Respiratory System



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Our own pathway, in order:

Mouth/Nasal Cavity

Pharynx

Larynx

Trachea

Bronchi

Bronchioles

Alveoli (tiny air sacs)

(b) (i) A large surface area over which exchange can take place.

(ii) A concentration gradient without which nothing will diffuse.

(iii) A thin surface across which gases diffuse.

(iv) Warm conditions.

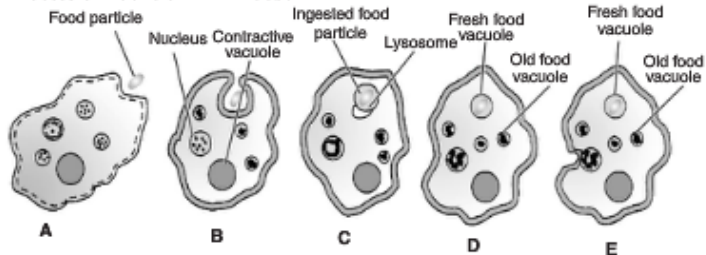
**Q. (a) Draw a diagram to show the nutrition in Amoeba and label the parts used for this purpose. Mention any other purpose served by this part other than nutrition.**

**(b) Name the glands associated with digestion of starch in human digestive tract and mention their role.**

**(c) How is required pH maintained in the stomach and small intestine?**

**Answer. (a)**

Process of nutrition in Amoeba :



Pseudopodia serves the purpose of locomotion apart from nutrition.

(b) The salivary gland is associated with digestion of starch in human digestive tract.

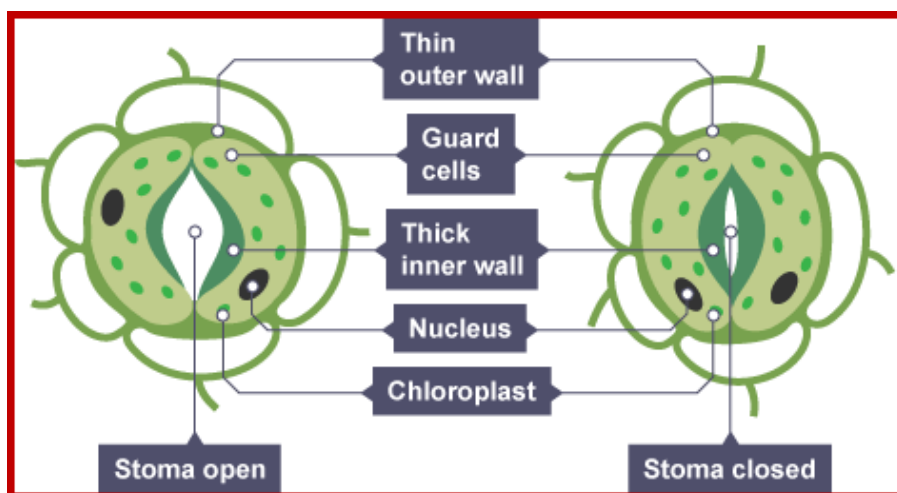
It secretes saliva which contains enzyme salivary amylase. This enzyme converts starch into maltose (sugar).

(c) Gastric glands present on the walls of the stomach release HCl. HCl creates an acidic medium, which facilitates the action of enzyme pepsin. Bile juice from liver makes the food alkaline in small intestine for the pancreatic enzymes to act.

**Q. (a) Draw a labelled diagram of stomata. List two functions of stomata.**

**(b) What are the raw materials used during photosynthesis? Write chemical equation for photosynthesis.**

**Answer. (a)**



- (i) Gaseous exchanges between plant and the atmosphere.
  - (ii) Plant loses water through stomata which helps in movement of minerals from soil to leaves.
  - (b) Raw materials for photosynthesis: Carbon dioxide, water, chlorophyll and sunlight are the essential raw materials for photosynthesis.
  - (i) Carbon dioxide is a gas, which is released into the atmosphere during respiration. This gas is utilised by the autotrophic plants which enters the leaf through the stomata present on its surface during the process of photosynthesis.
  - (ii) Water is another requirement for photosynthesis, which is transported upward through xylem tissues to the leaves, from where it reaches the photosynthetic cells. This water then splits in the presence of sunlight and chlorophyll.
  - (iii) Chlorophyll is a green pigment in plants, which acts as a catalyst. It is responsible for absorption of the sun's energy by the plant. The chlorophyll pigments are photoreceptor molecules which play a key role in the photosynthetic process. The different types of chlorophyll molecules are chlorophyll a, b, c, d, e and bacteriochlorophyll; of which chlorophyll a and b are the most common.
  - (iv) Light affects photosynthesis by its intensity, quality and duration. In green light, the rate of photosynthesis is minimum, while in red and blue lights the rate of photosynthesis is maximum. Rate of photosynthesis is higher in plants getting average light of 10-12 hrs a day.
- The chemical equation for photosynthesis is as follows:



**Q. (a) Leaves of a healthy potted plant were coated with vaseline to block the stomata. Will this plant remain healthy for long? State three reasons for your answer.**  
**(b) State any two differences between autotrophic nutrition and heterotrophic nutrition.**

**Answer.** (a) No, this plant will not remain healthy for long. The plant will begin to die because  
 (i) Gaseous exchange will not take place.  
 (ii) No absorption of  $\text{CO}_2$ , hence no photosynthesis.  
 (iii) Transpiration will not occur; hence no transportation of water.

Autotrophic nutrition	Heterotrophic nutrition
<p>(i) In this nutrition, the organisms make their food from carbon dioxide and water in the presence of sunlight and chlorophyll.</p> <p>(ii) All green plants are autotrophic and use light as a source of energy for photosynthesis.</p>	<p>(i) In this nutrition, the organisms derive their food or nutrients from other living organisms.</p> <p>(ii) The energy is derived from the intake and digestion of the organic substances.</p>

**Q. (a) List the three events that occur during the process of photosynthesis. Explain the role of stomata in this process.**  
**(b) Describe an experiment to show that "sunlight is essential for photosynthesis."**

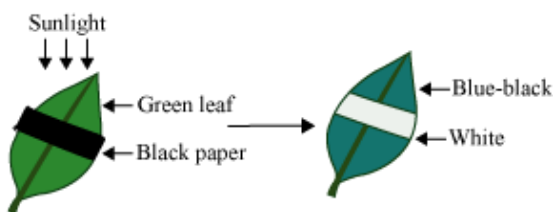
**Answer.**

- (a) The three events that occur during the process of photosynthesis are:  
 (i) Absorption of light energy by the green pigment chlorophyll.  
 (ii) Conversion of light energy into chemical energy and the splitting of water molecule into hydrogen and oxygen.  
 (iii) Reduction of carbon dioxide into carbohydrate.

**Role of Stomata**

Stomata are tiny pores present on the surface of leaves. They are also present on the surface of young stems. Stomata are mainly engaged in the exchange of gases (entry of  $\text{CO}_2$  and release of  $\text{O}_2$ ) associated with photosynthesis. Plant closes the stomata when it does not need  $\text{CO}_2$  for photosynthesis.

- (b) Sunlight is essential for photosynthesis



**Procedure:**

- (i) Place a healthy green potted plant in a dark room for 1-2 days. This is done to ensure that the plant consumes all its reserve food and the leaves do not contain any starch.  
 (ii) Then, cover a portion of a leaf of this plant on both sides with two uniform pieces of black paper, fixed in position with two paper clips.  
 (iii) Now, expose this plant to bright light. After a few hours, remove the leaf and decolorize it with alcohol and test the presence of food (starch) with iodine solution.

Observation: It can be observed that the portion of the leaf covered with black paper does not (food),

Conclusion: This is because the food prepared by plants through the process of photosynthesis is stored as starch. Starch reacts with the iodine solution to give blue-black colour. Only those portions of the leaf that were exposed to sunlight could photosynthesise. Hence, gives blue-black colour when tested with iodine. The portion of the leaf covered with black paper did not receive sunlight. Hence, starch was not produced. Thus, it can be concluded that the sunlight is essential for photosynthesis.

**Q. (a) What is meant by breathing? What happens to the rate of breathing during vigorous exercise and why?**  
**(b) Define translocation with respect to transport in plants. Why is it essential for plants? Where in plants are the following synthesised?**  
**(i) Sugar (iii) Hormone**

**Answer.** (a) The process of taking in of oxygen from air in to the lungs and expulsion of carbon dioxide out of the lungs is called breathing. The rate of breathing during vigorous exercise increases by about 20 to 25 times per minute. It is because, during vigorous exercise the demand for oxygen increases. Breathing occurs involuntarily but its rate is controlled by the respiratory center of the brain.

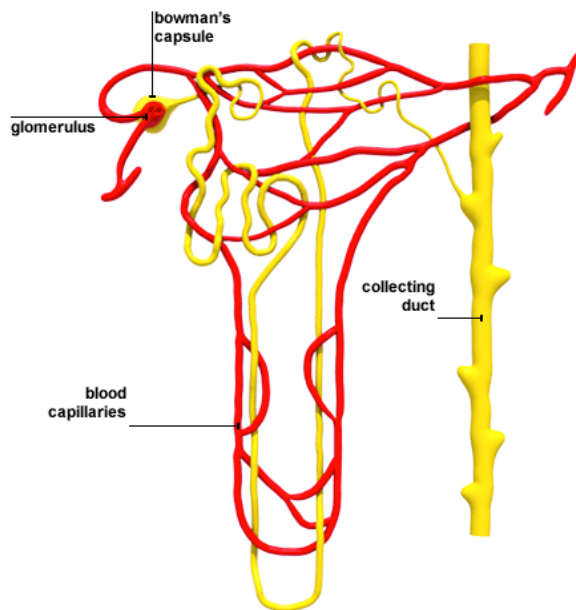
(b) Translocation is the transport of food from the leaves to other parts of the plant and occurs in the part of the vascular tissue known as phloem.

It is essential for plants because every part of the plant needs food for obtaining energy for building its parts and maintaining its life.

- (i) Sugar is synthesised in the leaves of the plant.  
 (ii) Hormones are synthesised at the tips of roots and stems of a plant.

**Q. (a) Draw the structure of a nephron and label the following on it: Glomerulus, Bowman's capsule, Renal artery, Collecting duct.**  
**(b) What happens to glucose that enters the nephron along with filtrate?**

**Answer. (a)**



(b) During excretion in human beings, glucose which enters the nephron along with filtrate gets reabsorbed by blood capillaries surrounding the nephron.